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<p>(54) Title: A CONNECTOR</p> <p>(57) Abstract</p> <p>A connector for poles having a male connector (3) portion attached to an end of the pole (1) and a female portion (4) attached to, for example a mop head (2). The female portion has a boss (7) into which the male portion can be inserted. The interior of the boss has a plurality of tapered ribs (10) which engage in a resilient manner with the male portion. The male portion has ribs which deform channels in the female portion. The deformation of the channels causes the boss to contract. The connector provides a releasable connection for a mop. The mop head can be easily removed and discarded after cleaning.</p>			

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A CONNECTOR

This invention relates to a connector particularly but not exclusively for a cleaning mop.

European Patent Application No. 90301531.1 (Publication No. 0383552) discloses an attachment device for connecting a pole handle to a mop head. The attachment device comprises a collar connected to a boss. The interior surface of the boss has a series of tapered ribs which extend axially, increasing in depth towards the collar. The boss comprises a number of longitudinal slots bridged by U-shaped bridge portions. A pole is inserted into the boss. The bridged slots allow the diameter of the boss to be elastically expanded to accommodate poles of differing diameters. The ribs of the boss interior engage the pole in a permanent fixing relationship preventing relative motion between the pole and the boss.

In certain environments, for example hospitals, different mops have to be used in different areas to prevent cross-contamination. In addition, mop heads have to be sterilized regularly. It is necessary to be able to remove a mop head to sterilize it or to swap it with another designated for a different cleaning area. The above arrangement has the disadvantage that it is often difficult to connect it to and remove it from the handle. A user of such a mop may waste time in trying to remove or connect the head to the handle and often has to touch parts of the mop head which may be contaminated. Furthermore, if the mop head can be removed from the handle the ribs are generally deformed such that the head cannot be re-used.

Accordingly, it is an object of the present invention to provide a removable connector arrangement between a mop head and a pole, using an attachment device of the type described in European Patent Application No.90301531.1.

According to the present invention there is provided a connector for poles comprising a female connector portion having a boss into which the pole is secured, the inner surface of the boss having a longitudinal rib, characterised in that the connector comprises a male portion designed to receive said rib in resilient engagement.

Preferably the boss has a plurality of said ribs to enable a secure connection between the male and female portion.

The male portion may have at least one projection which locates in a corresponding channel in the boss. The insertion of the male portion into the boss causes the channel to be deformed by the projection which may be tapered. This results in the boss being contracted radially inwards to give a more secure connection between the male portion and the rib or ribs.

In a preferred embodiment the male portion has three equi-spaced projections which locate in corresponding channels.

The projections are formed along the longitudinal length of the male connector parallel to the longitudinal axis of the pole and are tapered in the longitudinal direction.

Embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective scrap view of a cleaning mop with a first embodiment of a connection device according to the present invention;

Figure 2 is a cross sectional view of a female portion of the connection device of figure 1;

Figure 3 is a perspective view of a mop assembled from the components shown in Figure 1;

Figure 4 is a view showing an end of a male portion of a second embodiment of the present invention; and

Figure 5 is a part sectioned side view of Figure 4.

Referring now to the drawings, a pole 1 is shown which is connectable to a cleaning mop head 2. The pole carries a male connector 3 and the mop head 2 has a female connector portion 4. The female connector portion comprises a downwardly inclined collar 5 to one side of which are attached the yarns 6 of a mop. The manner of attaching the mop yarns 6 is known in the art and is not pertinent to the present invention. The other side of the collar 5 is fixed to an end of a boss 7.

The boss 7 is substantially cylindrical having an interior into which the male portion 3 of the connector is received. The wall of the boss has three longitudinal slots 8 therein each bridged by an arcuate outwardly protruding rib 9. The thickness of each bridging rib 9 is

substantially less than that of the boss wall. As described in European Application No. 90301531.1 this arrangement allows the diameter of the boss to expand to accommodate poles of various diameters.

The interior of the boss has a series of axially extending ribs 10 along the length of the wall. The ribs 10 each project inwardly towards the central axis of the boss 7. At a point approximately two thirds of the length of boss 7 from the open end the ribs 10 taper outwardly from the boss 7 wall. In addition the ribs 10 may increase in cross sectional area towards the collar 5 end of the boss 7. In an alternative embodiment the ribs 10 may taper gradually from the open end to the collar 5 end of the boss 7.

In the embodiment shown in Figure 1 the male portion 3 comprises two spigots (one hidden) separated by a radially outwardly extending flange 11. A first spigot (hidden) is inserted into a hollow end of the pole 1 until the flange 11 abuts the pole 1 end, and is fixed to the pole 1 by means of a rivet 12. A second spigot 13 is designed to releasably engage with the boss 7. Of course it is to be understood that the male portion 3 can be fixed to the pole 1 in any conventional manner or it may be formed in the end of the pole 1 itself.

The second spigot 13 has a substantially cylindrical main body and a inwardly tapering hollow end 14. The main body of the second spigot 13 has a series of longitudinal channels 15 formed on its surface and a single protruding rib 16 parallel to said channels 15. Aligned with the channels 15 are slots 17 formed in the tapered end of the spigot 13. The slots 17 themselves are tapered in depth such that they increase in depth towards the free end of the spigot 15 and cut right through the wall of the hollow end 14 at about halfway along its length.

In use, the male connector 3 of the pole 1 is inserted into the boss 7 of the mop head 2 by aligning the rib 16 on the male connector 3 with one of the slots 17 in the boss 7. By pushing the pole 1 all the way into the boss 7 the ribs 10 on the interior of the boss 7 engage in the slots 17 provided in the tapered end 14 of the male connector 3. In this position the flange 11 abuts the end of boss 7 and covers it completely to prevent dirt from becoming trapped in the connector arrangement. The slotted arrangement allows the end 14 of the male

connector 3 to expand slightly to accommodate the ribs 10 and then to contract over them in resilient engagement. Thus secure engagement is effected by both frictional and gripping forces between the ribs 10 and slots 17. To separate the pole 1 from the head 2 one merely has to pull them apart. The engagement is sufficiently secure to obviate the need for a nail or the like to be hammered through the pole and head to connect the two.

A second embodiment of the male portion 3' is shown in Figure 4. It is used with the same female portion 4 and mop head 2. As described above a first spigot (hidden) is inserted into the hollow end of the pole 1 until a flange 11' abuts the pole end. However, the second spigot is of a slightly different design whilst still using the same principle as the design of the first embodiment.

The second spigot 30 is substantially tubular with three longitudinal ribs 31 designed to locate in the three slots 8 of the boss 7. Sides 32 of the ribs 31 taper inwardly away from the pole 1. On the inside surface of the male portion 3' slots 33 are formed in the ribs 31 to provide the male portion 3' with a degree of resilience.

In use the male portion 3' of the connector is inserted into the boss 7 of the female portion 4 by aligning the ribs 31 on the male portion 3' with the slots 8 in the boss 7. By pushing the pole 1 into the boss 7 the ribs 31 push the bridging ribs 9 radially and circumferentially outwards. The taper on each rib 31 helps this action. The bridging ribs 9 are deformed by the longitudinal ribs 31 and the walls of the boss 7 are caused to contract radially inwardly. This results in the ribs 10 of the boss 7 gripping the male portion 3' tighter in resilient frictional engagement. There are three ribs 10 of the female portion 4 located between each longitudinal rib 31 of the male portion 3'. The engagement is sufficiently secure to obviate the need for a nail or the like to be hammered through the pole 1 and head 2 to connect the two.

It will be appreciated that the important factor in the connector is resilient engagement of the ribs 10 of the boss with the male portion 3, 3' of the connector and this is achieved by the deformability of the walls of the boss 7.

The invention as described has particular application to cleaning environments which require different mop heads to be used in

different areas to prevent cross contamination as in, for example, a hospital. Instead of having to keep a set of mops, a single pole can be purchased with a set of interchangeable mop heads, one for each area. Additionally, a mop head can be removed from a pole without deformation of the ribs so that it can be cleaned and disinfected for re-use.

The arrangement described above allows the mop head to be removed from or connected to the pole quickly and easily for sterilization.

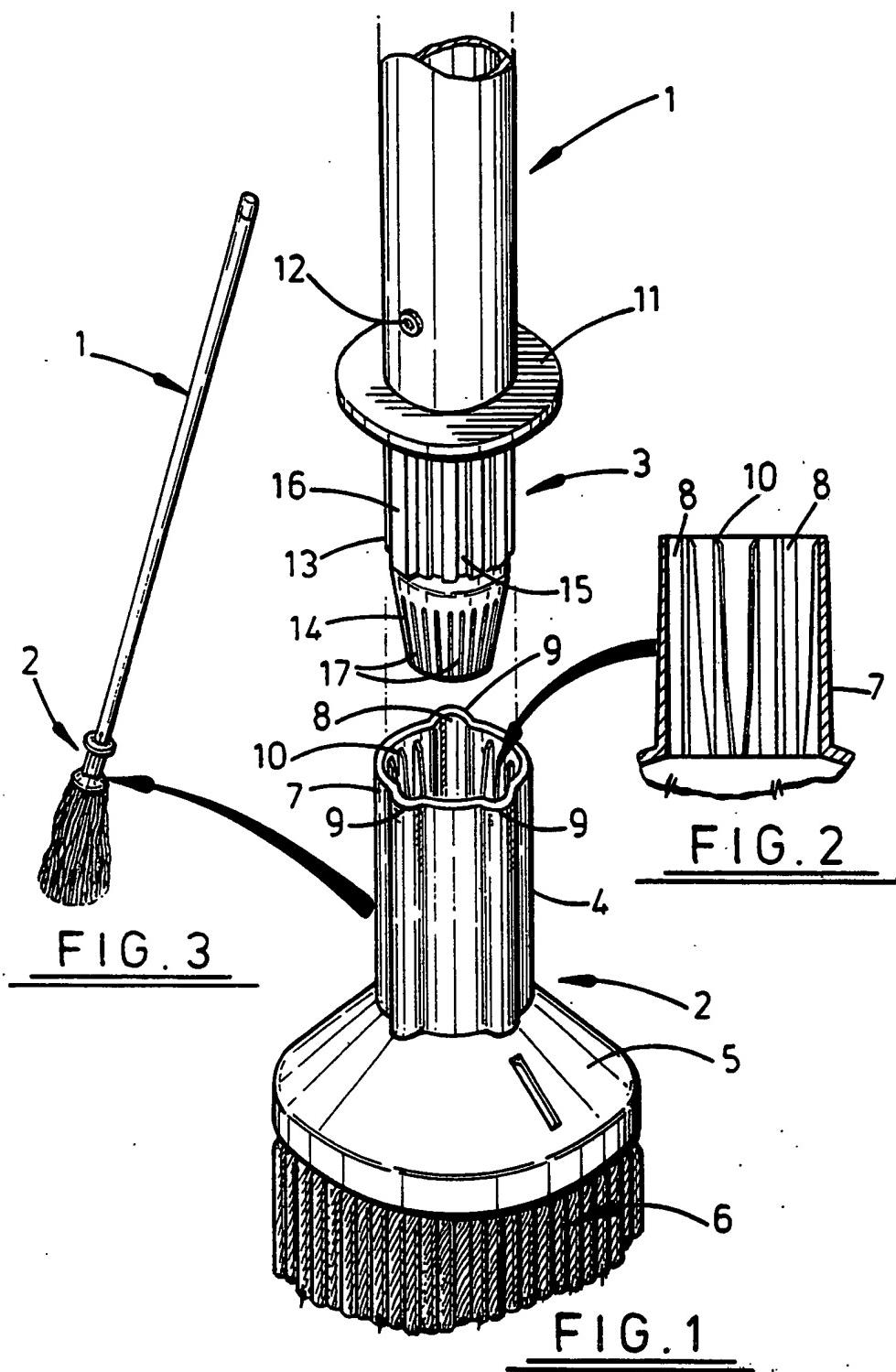
The mop heads and handles may be colour coded so as to indicate which designated cleaning area they are intended for.

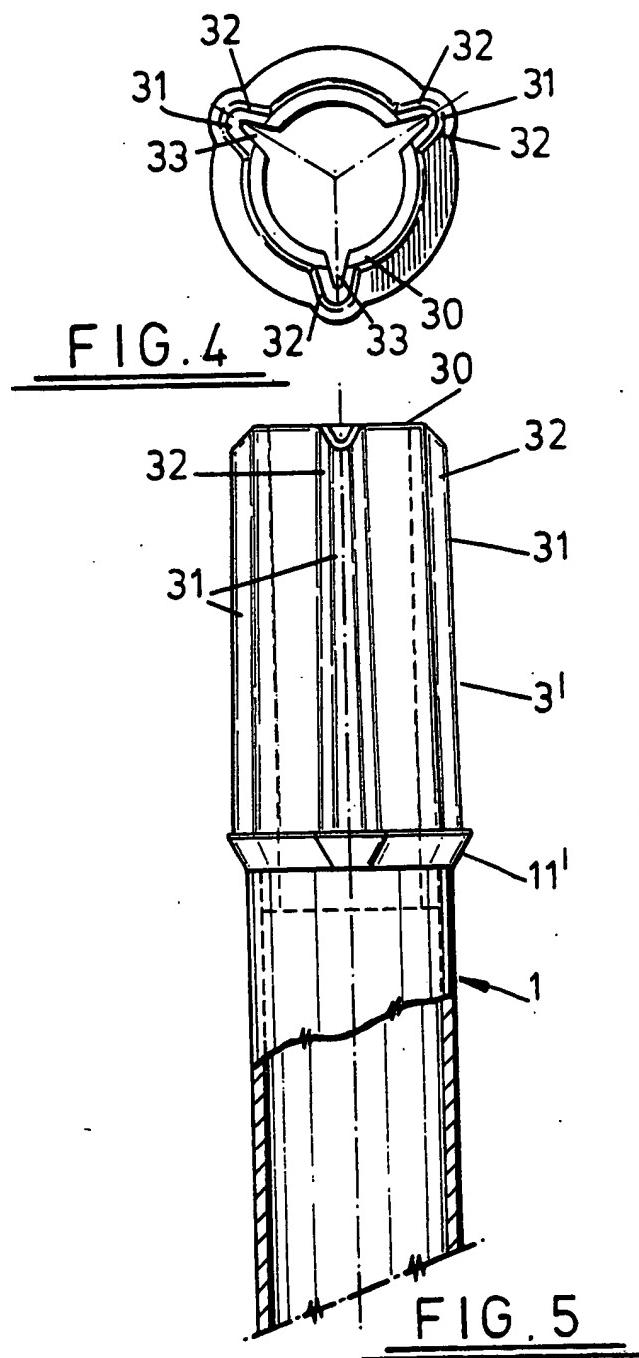
It is to be understood that application of the present invention is not limited to mops but can be used in any application where a pole-like item has to be releasably connected to another object.

CLAIMS

1. A connector for poles comprising a female connector portion having a boss into which the pole is secured, the inner surface of the boss having a longitudinal rib, characterised in that the connector comprises a male portion designed to receive said rib in resilient engagement.
2. A connector according to claim 1 wherein the boss has a plurality of said ribs.
3. A connector according to claim 1 or 2, wherein the male portion has at least one projection which locates in a corresponding channel in the boss.
4. A connector according to claim 3, wherein the insertion of the male portion into the female portion causes deformation of the channel by the projection such that the boss contracts radially inwardly onto the male connector.
5. A connector according to claim 3 or 4, wherein there are three equi-spaced projections which locate in corresponding channels in the boss.
6. A connector according to claim 3, 4 or 5, wherein the projection is formed along the length of the male portion parallel to the longitudinal axis of the pole and has a longitudinal taper on its surface.
7. A connector according to any preceding claim, wherein the ribs are tapered.
8. A connector according to any of claims 3 to 7, wherein the male portion is hollow and the projection is slotted to provide flexible resilience.

9. A mop comprising a mop head and a pole characterised in that there is provided a connector according to any preceding claim.

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2 / 2**SUBSTITUTE SHEET**

INTERNATIONAL SEARCH REPORT

International Application

PCT/GB 93/00156

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 A47L13/24; B25G3/10		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	A47L ; B25G	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US,A,3 601 836 (J. GUNFAUS) 31 August 1971 see column 2, line 10 - column 3, line 11; figure 3 ---	1-8
Y	US,A,3 752 202 (H. F. CONDON) 14 August 1973 see the whole document ---	1-7
Y	EP,A,0 383 552 (HAROLD WATSON LTD) 22 August 1990 cited in the application see the whole document ---	1-7
A	US,A,4 722 634 (T.J. MALISH) 2 February 1988 see the whole document ---	1-4 -/-
<p>¹⁰ Special categories of cited documents :¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 14 MAY 1993	Date of Mailing of this International Search Report 29.06.93	
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer M. VANMOL	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2 058 647 (CORONET-METALLWARENFABRIK GMBH) 15 April 1981 see the whole document ---	1-8
A	US,A,3 052 907 (M.J. KUBICK) 11 September 1962 see the whole document ---	1,2
A	GB,A,141 180 (ENTWISLE & KENYON LTD) 6 May 1920 -----	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9300156
SA 70171

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-3601836	31-08-71	None		
US-A-3752202	14-08-73	None		
EP-A-0383552	22-08-90	US-A-	5066162	19-11-91
US-A-4722634	02-02-88	None		
GB-A-2058647	15-04-81	DE-A- 2937967 AT-B- 386148 BE-A- 885279 FR-A- 2465569 NL-A- 8005151 US-A- 4371282	02-04-81 11-07-88 16-01-81 27-03-81 24-03-81 01-02-83	
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